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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Knobbe Martens Olson & Bear LLP
2040 Main Street
Fourteenth Floor
Irvine, CA 92614

EXAMINER

Perez Daple, Aaron C

ART UNIT	PAPER NUMBER
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2121

DATE MAILED: 06/25/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/727,424	KAJI ET AL.	
	Examiner	Art Unit	
	Aaron C Perez-Daple	2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 01 December 2000.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 3/19/2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) <u>6</u> | 6) <input type="checkbox"/> Other: |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because:
 - i. Figures 5 and 6 fail to show the relationship between the fuzzy control module and the autonomous evolutionary process unit as described in the specification on page 11, lines 3-6.
 - ii. Figure 5 fails to show a throttle control element.
 - iii. The figures fail to clearly show the relationship between the total table and the fuzzy rule table.
 - iv. Figures 8 and 10 show a method for switching between “evolutionary mode” and “regular control mode.” They do not show a method for switching between autonomous evolution and interactive evolution. Such a method is necessary, as both evolutionary processes cannot occur simultaneously as disclosed by applicant on page 16, lines 3-5.

Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing.

MPEP § 608.02(d). A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The abstract of the disclosure is objected to because it does not fully describe applicant's claimed invention. Applicant's claimed invention pertains to a control system which includes genetic algorithms and fuzzy inference. These or similar descriptive terms should be included in the abstract. Correction is required. See MPEP § 608.01(b).
3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The examiner suggests, "A Control System for Optimizing the Function of a Machine Assembly using GA-Fuzzy Theory."
4. The disclosure is objected to because of the following informalities:
 - i. The description of the interactive autonomous evaluation method is not located in the proper place within the specification or is not complete. The relevant description should be continued from page 12, section (a), as section (b).
 - ii. Page 13 line 2 incorrectly refers to step 1-2 of figure 8. It should refer to step 1-5.
 - iii. The specification does not refer to the acceleration optimization control line shown in figure 12.

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with contradictions and terms and phrases which are not clear, concise and exact. The specification should be

revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some contradictions and unclear, inexact or verbose terms used in the specification are:

- iv. Based on figure 1c, line 6 of page 6 should read “in parallel” rather than “in a line.”
- v. Page 11, lines 23-24, the term “interactive optimum process” is not defined. The examiner understands this term to mean, “interactive evaluation process.”
- vi. Lines 9-10 of page 14 contradict with lines 31-32 of page 13. Page 13 states that the interactive evolutionary process is terminated once the desired boat operation characteristic is obtained. Page 14 states that the interactive evolutionary process is repeated until the stipulated generations are reached. Both cannot be correct.
- vii. Page 20 lines 24-26 imply a difference between the standardized coefficients for the fuzzy control module and the fuzzy rules. However, page 6, lines 27-29, states that parameters may be standardized coefficients; and lines 31-32 of page 6 state, “Each section of the matrix represents a fuzzy rule which is a parameter having a value.” Therefore lines 24-26 of page 20 do not show any distinction between the autonomous evaluation and the interactive evaluation.
- viii. The “total table” of page 14, line 12 is not clearly defined.

- ix. Lines 26-33 of page 12 require that pitch and Dutch roll be detected by the control system. However, no sensors are disclosed for detecting pitch or Dutch roll.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The phrase “monitoring the fuzzy rule matrix in use” recited in lines 1-2 of claim 8 is not defined by the claim and the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

For examination purposes, the examiner assumes that the phrase “monitoring the fuzzy rule matrix in use” means that parameters or data from the fuzzy rule matrix will be used as inputs for other devices or operations.

7. Claim 13 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for “the optimization apparatus of Claim 12, further comprising a compensation control module for deciding compensation quantity or compensation ratio of the manipulated variable based on predetermined input information,” does not reasonably provide enablement for said compensation control module, “whereby the optimization process device optimizes control parameters of the compensation control module with the control characteristic of the combined apparatus as an evaluation criteria.” The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to verify the invention commensurate in scope with these claims. Although figure 1d, for example, shows an optimization process device (labeled “optimization system”), a basic control module (labeled “central control module”), and a compensation control module (labeled “local control module”), said optimization process device does not pass parameters to said compensation control module.

For examination purposes, the examiner assumes that either:

- i. the optimization process device passes control parameters to the compensation control module via another element, such as the basic control module; or
- ii. the basic control module passes control parameters to the compensation control module.

8. Claims 1-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 1 and 11, in lines 1 and 4, respectively, recite the phrase "in real-time." The phrase "in real-time" is not defined by the claim and the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.

Moreover, the optimization method as disclosed inherently requires a significant amount of time to run a "trial ride" for each individual of each generation. Response of the optimization apparatus is not optimized until the evolution process is complete. The evolution process would have to be repeated each time environmental or "use" conditions changed. Therefore, the method as disclosed is not capable of providing a response "in real-time", unless "in real-time" is interpreted loosely to mean occurring during operation of the device.

For examination purposes, the examiner reads "in real-time" to mean occurring during operation of the device.

As dependent claims, claims 2-10 and claims 12-25 suffer from the same deficiencies as claims 1 and 11.

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

10. Claims 14-17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Line 7 states "carries out optimization." It is not clear what object, device or process carries out said optimization. For examination purposes, the examiner assumes that the optimization apparatus carries out said optimization.

As dependent claims, claims 16-17 suffer from the same deficiencies as claim 14.

As for claim 15, line 11 of page 26 states "carries out optimization." It is not clear what object, device or process is carrying out said optimization. For examination purposes, the examiner assumes that the optimization apparatus carries out said optimization.

11. Claims 14 and 15 recite the limitation "the optimization process" in line 1 and line 8, respectively, of page 26. There is insufficient antecedent basis for this limitation in the claims.
12. Claim 15 recites the limitation "the result" in line 10 of page 26. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

14. Claims 1-3 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Jeong et al (US 5,673,565) (hereinafter Jeong). As for claim 1, Jeong discloses:

A method for optimizing in real-time operation of a machine assembly manipulated by a user, said machine assembly comprising plural replaceable devices (e.g. figure 1, elements 33 and 47), each device being operated by a control module (e.g. figure 6), the input-output relationship of which control module is regulated by control parameters, said method comprising the steps of:

(a) operating the replaceable devices using control modules (e.g. col. 2, line 59 through col. 3 line 3);

(b) optimizing in real-time the input-output relationship of at least one control module by coding into templates parameters fully or partially regulating the control module, said templates being subjected to heuristic processing, wherein at least one fitted set of parameters is selected by evaluating output of the machine assembly based on the user's ultimate choice or a preselected target (e.g. col. 2, line 59 through col. 3 line 3); and

(c) operating the machine assembly using the optimized control module (e.g. col. 2, line 59 through col. 3 line 3).

15. As for claim 2, Jeong further discloses:

The method according to Claim 1, wherein the control module comprises a main control module and an auxiliary control module, and step (b) is conducted on the auxiliary control module (e.g. figure 3).

16. As for claim 3, Jeong further discloses:

The method according to Claim 2, wherein the main control module and the auxiliary control module are arranged in series (e.g. figure 3).

17. As for claim 5, Jeong further discloses:

The method according to Claim 1, wherein the control module comprises a central control module and a local control module, and step (b) is conducted on the central control module (e.g. figures 3 and 6).

18. Claims 11-14 and 16-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Lee et al (US 5,774,630) (hereinafter Lee).

As for claim 11, Lee discloses:

An optimization apparatus for optimizing an operation characteristic of a unitary apparatus that can be used as a combined apparatus by combining other apparatuses, (e.g. figures 4A and 4B) the optimization apparatus comprising:

an optimization process device (e.g. figures 4A and 4B, elements 14, 32, 34 and 36) for, in real time, optimizing the operation characteristic of the unitary apparatus, with a functional characteristic of the combined apparatus as an evaluation criteria (e.g. col. 2, line 43 to col. 3 line 10).

19. As for claim 12, Lee discloses:

The optimization apparatus of claim 11, further comprising a basic control module for deciding a manipulated variable of the unitary apparatus based on predetermined input information, whereby the optimization process device optimizes control parameters of the basic control module with a control characteristic of the combined apparatus as the evaluation criterion (e.g. figure 4A, element 18).

20. As for claim 13, Lee discloses:

The optimization apparatus of claim 12, further comprising a compensation control module for deciding compensation quantity or compensation ratio of the manipulated variable based on predetermined input information, whereby the optimization process device optimizes control parameters of the compensation control module with the control characteristic of the combined apparatus as an evaluation criterion (e.g. figure 4A, element 16).

21. As for claim 14, Lee discloses:

The optimization apparatus of claim 11, wherein the optimization process device includes an optimization operation unit for performing operation with respect to a optimization technique, and an autonomous evaluation unit for evaluating with respect to optimization process based on a predetermined evaluation criterion, whereby the optimization process device controls using control parameters obtained by the optimization operation unit, and evaluating the result at the evaluation unit, carries out optimization (e.g. figures 4A and 4B; col. 3, line 52 through col. 4, line 44).

22. As for claim 16, Lee discloses:

The optimization apparatus of claim 14, wherein the optimization operation unit carries out operation with regard to optimization using heuristics (e.g. col. 4, lines 46-67).

23. As for claim 17, Lee discloses:

The optimization apparatus of claim 16 wherein the heuristics is an evolutionary calculation method (e.g. col. 4, lines 60-67).

Claim Rejections - 35 USC § 103

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

25. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong in view of Kamihira (EP 0957416 A1) (hereinafter Kamihira). Jeong does not specifically disclose the arrangement of the main control module and the auxiliary control module in a line (in parallel). However, Kamihira discloses a method similar to that of claim 2, wherein the main control module and the auxiliary control module are arranged in a line (col. 15, lines 32-37).

Furthermore, Kamihira states the advantage for combining the main and auxiliary control modules in parallel that changes can occur in one control module without

affecting the state of other control modules (col. 4 lines 37-49). Moreover, it becomes possible to alternate processes between modules (col. 15, lines 37-48).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Jeong with Kamihira in order to change one control module without affecting other control modules and to alternate processes between modules.

26. Claims 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong in view of Bonissone et al (US 5,995,737) (hereinafter Bonissone). Although chromosomes are inherent in the use of genetic algorithms (e.g. any data, parameters, rules or functions acted on by the genetic algorithm may be considered a “chromosome”), Jeong does not specifically disclose the use of chromosomes as templates. However, Bonissone discloses a method similar to claim 1:

wherein the heuristic processing is evolutionary computation, and the templates are chromosomes (e.g. col. 6, line 39-46).

Bonissone further discloses that this method allows for smooth control of a combined apparatus and minimal error between a measured value of a controlled variable and a desired value of said controlled variable (e.g. col. 1 line 55 through col. 2 line 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Jeong with Bonissone in order to allow for smooth control of the combined apparatus and minimal error of a controlled variable.

27. As for claim 7, Jeong does not specifically disclose the use of genetic algorithms to revise or modify a matrix of fuzzy rules, however Bonissone discloses a method similar to that of claim 6:

wherein the control module regulated by control parameters is provided with a fuzzy inference system comprising a matrix of fuzzy rules (e.g. figure 5) which are regulated by preselected parameters, and the optimization step is conducted by at least one of the following:

- i. revising the fuzzy rule matrix by extracting a section from the matrix and coding elements of the section into chromosomes (e.g. figures 6 and 7, col. 6 line 34 through col.7 line 23);
- ii. modifying the configuration of the fuzzy rule matrix defined by membership functions by coding elements of the membership functions into chromosomes (e.g. figures 6 and 7, col. 6 line 34 through col.7 line 23); or
- iii. changing a level of an input of the parameters and a level of an output of the fuzzy inference system by coding elements of the levels into chromosomes (e.g. figures 6 and 7, col. 6 line 34 through col.7 line 23).

Bonissone further discloses that this method allows for smooth control of a combined apparatus and minimal error between a measured value of a controlled variable and a desired value of said controlled variable (e.g. col. 1 line 55 through col. 2 line 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Jeong with Bonissone in order to allow for smooth control of the combined apparatus and minimal error of a controlled variable.

28. As for claim 8, Jeong does not specifically disclose monitoring the fuzzy rule matrix in use while operating the machine. However, Bonissone discloses a method similar to that of claim 7:

further comprising monitoring the fuzzy rule matrix in use while operating the machine, and evaluating the section extracted in (ii) or the membership functions to be modified in (iii) (e.g. figure7).

Bonissone further discloses that this method allows for smooth control of a combined apparatus and minimal error between a measured value of a controlled variable and a desired value of said controlled variable (e.g. col. 1 line 55 through col. 2 line 7).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Jeong with Bonissone in order to allow for smooth control of the combined apparatus and minimal error of a controlled variable.

29. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being obvious over Jeong in view of Kamihira. As for claim 9, Jeong does not specifically disclose the method of claim 1 wherein the machine assembly is a watercraft. However, Kamihira discloses a global control method similar to that of claim 1 for application to any type of vehicle (e.g. col. 5 line 57 through col.7 line 2), which includes watercraft.

Kamihira further discloses that the global control method has the advantage of adapting to the preferences of plural users (e.g. col. 1 lines 34-54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teaching of Kamihira and Jeong to allow for adaptable control of a watercraft.

30. As for claim 10, Jeong does not specifically disclose the method of claim 1, wherein the replaceable devices include a trim apparatus and an electronic throttle. However, Kamihira teaches the application of a global control method to an electronic throttle (e.g. figure 5), and he further teaches the use of a global control system for any type of vehicle(e.g. col. 5 line 57 through col.7 line 2). A trim apparatus is a standard replaceable device on a watercraft.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of Kamihira and Joeng to apply the method of claim 9, wherein the replaceable devices include a trim apparatus and an electronic throttle.

31. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee in view of Kamihira. Lee does not specifically teach the use of an evaluation input unit for inputting an evaluation based on a user's intention. However, Kamihira discloses an optimization apparatus similar to claim 11:

wherein the optimization process device includes an optimization operation unit for performing operation with respect to a optimization technique, an evaluation input unit for inputting an evaluation based on a user's intention with respect to

optimization process, whereby the optimization process device controls using control parameters obtained by the optimization operation unit, and evaluating the result at the evaluation unit based on evaluation information input by the evaluation input unit, carries out optimization (e.g. figure 1 element 1, col. 8 lines 14-19).

Kamihira further teaches that an advantage of the optimization apparatus is the ability to adapt to the preferences of the user (e.g. col. 1, lines 34-54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine Lee with Kamihira in order to adapt to the preferences of the user.

32. Claims 18-25 are rejected under 35 U.S.C. 103(a) as obvious over Lee in view of Kamihira. Claims 18-25 apply the generic control system of claim 11 to various embodiments, and they can be said to represent species of the generic control system of claim 11. Lee does not specifically teach applying the generic control system of claim 11 to different embodiments. However, Kamihira discloses a generic control system similar to applicant's which can be applied to a wide range of different embodiments where optimization or adaptation of a system to user preferences is important (e.g. col. 1 lines 34-54).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the control system of Lee to the various embodiments of claims 18-25, since Kamihira teaches the use of a generic control system for the purpose of adapting a system to the preferences of different users.

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33. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 6,314,412, note figure 1 and the abstract; US 5,857,321, note figure 1; US 5,683,275, note the trim control system disclosed; US 5,796,077, note figure 1; US 6,081,796, note figures 2-4; US 4,510,565 A, note col. 2 lines 56-68, col. 46 lines 12-15.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron C Perez-Daple whose telephone number is (703)305-4897. The examiner can normally be reached on 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached at (703)305-8498. The fax phone numbers for the organization where this application or proceeding is assigned are 703-746-7239 for regular communications and 703-746-7238 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

Aaron Perez-Daple
June 9, 2003


JOHN FOLLANSBEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100